In the Claims

The listing of claims presented below will replace all prior versions, and listings, of claims in the Application:

1. (Currently Amended) A method of autocalibrating a quantum key distribution (QKD) system having two encoding stations, a laser and a single-photon detector (SPD) unit, comprising:

a) performing a laser gate scan by sending a laser gating signal to the laser and varying an arrival time T of the laser gating signal over a first ~~select~~ range R1 to determine an optimal arrival time T_{MAX} that corresponds to ~~an~~ a first optimum number of photon counts from the SPD unit for photon signals generated by the laser and exchanged between the two encoding stations; and

b) performing laser gate dithering by varying the arrival time T over a second ~~select~~ range R2 surrounding T_{MAX} to maintain either the first optimum number of photon counts or a second optimum number of photon counts ~~count as optimum~~.

2. (Currently Amended) The method of claim 1, wherein the first and/or second optimum number of photon counts is/are ~~count is~~ either:

i) a maximum number of detected photons N_{MAX}, or ii) a maximum of the total number of photon counts N detected over a time interval divided by a number of double-clicks from the SPD unit over the time interval.

3. (Original) The method of claim 1, including:

terminating the laser gate dithering and performing another laser gate scan.

4. (Original) The method of claim 1, wherein the QKD system includes a programmable controller and a computer readable medium, wherein the laser gating signal is provided by the controller, and wherein the method is embodied in the computer readable medium such that the controller is capable of directing the QKD system to carry out acts a) and b).

5. (Currently Amended) A computer-readable medium having instructions embodied therein to direct a computer in a quantum key distribution (QKD) system having a laser to perform the following method of autocalibrating the QKD system:

a) performing a laser gate scan by sending laser gating signals to the laser and varying an arrival time T of the laser gating signals over a first range R1 to determine an optimal arrival time T_{MAX} that corresponds to an optimum number of photon counts from an SPD unit; and

b) performing laser gate dithering by varying the arrival time T of the laser gating signals over a second ~~select~~ range R2 surrounding T_{MAX} to maintain the photon counts as optimum[[;]] .

6. (Currently Amended) The computer-readable medium of claim 5, wherein the optimum number of photon counts is either:

i) a maximum number of photons N_{MAX}, or ii) a maximum of the total number of photon counts N over a time interval divided by a number of double-clicks from the SPD unit over the time interval.

7. (Currently Amended) A method of exchanging a key in a quantum key distribution (QKD) system having a laser and an SPD unit both operably coupled to a controller, comprising:

exchanging photon signals between encoding stations in the QKD system, where the photon signals are generated by the laser;

performing a first laser gate scan by sending laser gating signals from the controller to the laser over a range R1 of laser gating signal arrival times T;

establishing from the first laser gate scan a first optimal arrival time T_{MAX} for the laser gating signal corresponding to a first maximum number of photon counts N_{MAX} from the ~~detector~~ SPD unit;

terminating the first laser gate scan when the first T_{MAX} is established; and

performing a first laser gate dither by ~~the controller~~ altering the arrival time T over a range of arrival times R2 about the first T_{MAX} to maintain either the first maximum number of photon counts N_{MAX} or a different maximum number of photon counts N'_{MAX} over the range R2.

8. (Currently Amended) The method of claim 7, wherein performing the first laser gate dither results in a new optimal arrival time T'_{MAX}.

9. (Currently Amended) The method of claim 7, further including:
terminating the performing of [[a]] the first laser gate dither; ~~and~~
performing a second laser gate scan;
terminating the second laser gate scan; and
performing a second laser gate dither.

10. (Original) The method of claim 7, further including terminating and repeating the first laser gate dither periodically so as to perform a series of laser gate dithers.

11. (Currently Amended) A computer-readable medium having instructions embodied therein to direct a computer in a quantum key distribution (QKD) system adapted to control the operation of the QKD system to perform the following method ~~of~~ autocalibrating of a QKD system, the method comprising:

sending photon signals between encoding stations in the QKD system, wherein the photon signals are generated by a laser in response to laser gating signals having associated arrival times T at the laser;

performing a first laser gate scan by varying the arrival time T over a first range of arrival times R1 to establish a first optimal arrival time T_{MAX} corresponding to a first maximum number of photon counts N_{MAX} from a detector unit in one of the QKD stations;

terminating the first laser gate scan when the first T_{MAX} is established; and

performing a first laser gate dither by altering the arrival time T over a second range of arrival times R2 < R1 about the first T_{MAX} to maintain either a) the first maximum number of photon counts N_{MAX}, or b) a different maximum number of photon counts N'_{MAX} over the second range R2.

12. (Currently Amended) A method of autocalibrating a quantum key distribution (QKD) system having a laser, a single-photon detector (SPD) unit and controller operably coupled to the laser and the SPD unit, comprising:

generating photon signals with the laser by activating the laser with laser gating signals sent from the controller, the laser gating signals having an associated laser gating signal timing T;

sending the photon signals between encoding stations in the QKD system;

performing a first laser gate scan to determine an optimum arrival time T_{MAX} [[of a]] for the laser gating ~~signal~~ signals ~~sent from a controller~~ to arrive at the laser by obtaining ~~an~~ a first optimum number of photon counts at the SPD unit;

terminating the first laser gate scan when T_{MAX} is established; and

periodically dithering the laser gating signal arrival time ~~timing~~ about T_{MAX} to maintain either the first ~~an~~ optimum number of photon counts or a second optimum number of photon counts [[;]] .

13. (Currently Amended) The method of claim 12, further including:

terminating the laser gating signal dithering; and

performing ~~a second~~ another laser gate scan [[;]] .

14. (Currently Amended) The method of claim 12, wherein the first and/or second optimum number of photon counts ~~is~~ is/are a maximum number of photon counts.

15. (Currently Amended) A method of autocalibrating a quantum key distribution (QKD) system having two encoding stations, and a laser coupled to a controller in one of the encoding stations, the method comprising:

performing a laser gate scan to establish an optimum arrival time of a laser gating signal at the laser that corresponds to ~~an~~ first optimum number of photon counts from a single-photon detector (SPD) unit in one of the encoding stations when exchanging photon signals between the encoding stations;

terminating the laser gate scan; and

performing a laser gate dither process by varying the arrival time of the laser gating signal around the optimal ~~value of the~~ arrival time in order to provide minor

adjustments to the arrival time ~~of the laser gating signal~~ that lead to the SPD unit yielding either the first ~~an~~ optimum number of photon counts, or a second optimum number of photon counts.

16. (Currently Amended) The method of claim 15, wherein the first and/or second optimum number of photon counts is either a maximum number of photon counts, or a maximum of a total number of photon counts for a given interval divided by a number of double-clicks in the same interval.